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Nuclear modification factor of inclusive and strange hadrons in OO collisions at \sqrt{s_{NN}=5.36 TeV with CMS

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High-momentum charged particles originate from the fragmentation and hadronization of partons that undergo hard scattering, and their yields are consequently sensitive to parton energy loss in the QGP. The CMS experiment has recently reported a significant suppression of charged-particle production in oxygen–oxygen (OO) collisions at \sqrt{s_{NN}} = 5.36 TeV, providing a first indication of parton energy loss even in intermediate-size systems.
In this talk, we discuss the CMS measurement of charged particle differential cross sections and the nuclear modification factor R_{AA} in oxygen-oxygen (OO) collisions as a function of $p_{T}. We present a comparison with models that incorporate parton energy-loss mechanisms. In addition, we also examine charged particle production in pO collisions.
To further probe this phenomenon, we study identified-strange hadrons, K^0_S and Lambda, which are particularly sensitive to hadronization dynamics. In the intermediate transverse momentum region, (2 < pT < 5 GeV), when the dominant particle production mechanism transitions from soft processes to hard scattering, effects from radial flow and quark coalescence become important. Radial flow boosts heavier particles to higher pT, while quark coalescence enhances baryon production relative to mesons in this region, leading to a modified nuclear modification factor for strange hadrons. We present the first measurement of the nuclear modification factor of identified strange hadrons, K^0_S and Lambda, in OO collisions at \sqrt{s_{NN}} = 5.36 TeV, providing new insights into the flavor dependence of parton energy loss and the role of strangeness in the QGP medium.

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